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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1-2-0203.3WO	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US02/26941	International filing date (day/month/year) 23 August 2002 (23.08.2002)	(Earliest) Priority Date (day/month/year) 24 August 2001 (24.08.2001)
Applicant INTERDIGITAL TECHNOLOGY CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2.  Certain claims were found unsearchable (See Box I).

3.  Unity of invention is lacking (See Box II).

4. With regard to the title,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the abstract,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 1A

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

None of the figures

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/26941

**Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**  

- The additional search fees were accompanied by the applicant's protest.  
No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/26941

**Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)**

The technical features mentioned in the abstract do not include a reference sign between parentheses (PCT Rule 8.1(d)).

**NEW ABSTRACT**

A subscriber unit implementing physical layer automatic repeat request includes a transmitter (12) and a receiver (16). The transmitter has a physical layer transmitter (12a), an acknowledge receiver (12b) for receiving the corresponding acknowledgement, and an adaptive modulation and coding controller (12c) for collecting retransmission statistics and adjusting the particular data encoding/modulation using the collected statistics. The receiver (16) has a physical layer receiver (16a), and an acknowledgement generator (16c) for generating an acknowledgement for each packet if that packet has an acceptable error rate

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/26941

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : H04L 12/54  
US CL : 370/465

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 370/236, 320, 342, 343, 465, 479, 480, 496

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
EAST

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
search terms: acknowledgement, ARQ, error rates

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,946,320 A (DECKER) 31 August 1999 (31.08.1999)	1-23
A	US 6,208,663 B1 (SCHRAMM et al) 27 March 2001 (27.03.2001)	1-23
A,P	US 6,317,418 B1 (RAITOLA et al) 13 November 2001 (13.11.2001)	1-23

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 17 November 2002 (17.11.2002)	Date of mailing of the international search report 13 FEB 2003
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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer <i>Ronald E. J.</i> Jasper Kwoh Telephone No. (703)305-4700
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## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1-2-0203.4WO	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US02/26940	International filing date (day/month/year) 23 AUGUST 2002	(Earliest) Priority Date (day/month/year) 24 AUGUST 2001
Applicant INTERDIGITAL TECHNOLOGY CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
 the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:
  - contained in the international application in written form.
  - filed together with the international application in computer readable form.
  - furnished subsequently to this Authority in written form.
  - furnished subsequently to this Authority in computer readable form.
  - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the
  - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
- 2.  Certain claims were found unsearchable (See Box I).
- 3.  Unity of invention is lacking (See Box II).
- 4. With regard to the title,
  - the text is approved as submitted by the applicant.
  - the text has been established by this Authority to read as follows:
- 5. With regard to the abstract,
  - the text is approved as submitted by the applicant.
  - the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
- 6. The figure of the drawings to be published with the abstract is Figure No. 3
  - as suggested by the applicant.
  - because the applicant failed to suggest a figure.
  - because this figure better characterizes the invention.

None of the figures.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/26940

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/26940

**Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)****NEW ABSTRACT**

A method and apparatus for physical automatic repeat request by a subscriber unit (38). A physical layer at the transmitter receives data (34a) and at the transmitters (42) formats the received data into packets having a particular encoding/data modulation. The physical layer contains n channels (41) which transmit the packets and retransmit packets upon failure to receive a corresponding acknowledgement for a given packet at an acknowledgement receiver (56). The subscriber unit (38) collects retransmission statistics and adjusts the particular encoding/data modulation at the transmitters (42) using the collected statistics.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/26940

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : H04B 7/00; H04L 1/16, 1/20

US CL : 370/437

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/437, 310, 431, 438; 375/260; 714/746, 748, 749, 751, 752

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST; terms searched: wireless, statistics, modulation, encoding, FEC, OFDM, NAK, FDE

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----	US 5,345,600 A (DAVIDSON) 06 September 1994, col. 3, line 28-col. 4, line 30.	1,7 ----
Y ----		2,5-6,8,9 ----
A		3,4
X ----	US 6,154,489 A (KLEIDER et al) 28 November 2000, col. 2, line 15-col. 3, line 10.	1,7 ----
Y ----		2,5-6,8,9 ----
A		3,4
Y	US 5,648,969 A (PASTERNAK et al) 15 July 1997, col. 5, lines 16-45.	2

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)		
"O" document referring to an oral disclosure, use, exhibition or other means	"G"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
26 SEPTEMBER 2002	10 FEB 2003

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  DANIEL RYMAN
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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/26940

## C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,128,276 A (AGEE) 03 October 2000, col. 12, lines 33-42; abstract lines 9-12.	3
A	US 5,956,624 A (HUNSINGER et al) 21 September 1999, col 4, lines 36-42.	3
Y	US 5,982,760 A (CHEN) 09 November 1999, col. 2, lines 52-57; col. 4, lines 54-57.	5,8
Y	US 5,657,325 A (LOU et al) 12 August 1997, col. 3, line 61-col. 4, line 3.	6,9